IN THE SPECIFICATION:

Please amend the specification as follows:

Please insert the following paragraph beginning at page 1, line 5, as follows:

-- This application is a continuation application of copending U.S. patent application number 09/986,918, filed November 13, 2001. --

Please substitute the paragraph beginning at page 1, line 15, with the following.

-- A conventional manufacturing process for manufacturing a semiconductor element such as an LSI or VLSI formed from a micropattern uses a reduction type projection exposure apparatus for transferring by reduction projection a circuit pattern drawn on a mask such as a reticle onto a substrate coated with a photosensitive agent. With an increase in the packaging density of semiconductor elements, demands have arisen for further micropatterning. Exposure apparatuses are coping with micropatterning along with the development of a resist process. --

Please substitute the paragraph beginning at page 1, line 16, and ending on page 2, line 5, with the following.

-- For example, a fluorine excimer laser has been applied to an exposure apparatus because of a short wavelength of 157 nm. The 157-nm wavelength falls within a wavelength region called a vacuum ultraviolet region. Light in this wavelength region is greatly absorbed by oxygen molecules. In other words, light hardly passes through the air. Thus, the fluorine excimer laser can only be applied in a low-oxygen-concentration environment. According to the reference "Photochemistry of Small Molecules" (Hideo Okabe, A Wiley-Interscience

Publication, 1978, p. 178), the absorption coefficient of oxygen to 157-nm light is about 190 $atm^{-1}cm^{-1}$. This means when 157-nm light passes through a gas at an oxygen concentration of 1% at one atmospheric pressure, the transmittance per cm is only

$$T = \exp(-190 \times 1 \text{ cm} \times 0.01 \text{ atm}) = 0.150.$$ --

Please substitute the paragraph beginning at page 3, line 6, with the following.

-- In such an exposure apparatus using an ArF excimer laser with a wavelength around ultraviolet rays, particularly, 193 nm, or a fluorine (F_2) excimer laser with a wavelength around 157 nm, an ArF excimer laser beam or fluorine (F_2) excimer laser beam is readily absorbed by a substance. A light absorption substance in the optical path must be purged to several ppm order or less. This also applied to moisture, which must be removed to <u>the</u> ppm order or less. --

Please substitute the paragraph beginning at page 4, line 25, and ending on page 5, line 5, with the following.

-- As described above, an exposure apparatus using an ultraviolet ray, particularly, an ArF excimer laser beam or fluorine (F_2) excimer laser beam suffers <u>from</u> large absorption of light of this wavelength by oxygen and moisture. To obtain a sufficient transmittance and stability of an ultraviolet ray, the oxygen and moisture concentrations in the optical path must be reduced. --

Please substitute the paragraph beginning at page 9, line 7, with the following.

-- According to the fourth aspect of the present invention, the foregoing object is attained by providing a device manufacturing method comprising the steps of installing, in a

semiconductor manufacturing factory, manufacturing apparatuses, for performing various processes, including the above exposure apparatus, and manufacturing a semiconductor device by performing a plurality of processes using the manufacturing apparatuses. --

Please substitute the paragraph beginning at page 10, line 7, with the following.

-- According to the fifth aspect of the present invention, the foregoing object is attained by providing a semiconductor manufacturing factory comprising: manufacturing apparatuses, for performing various processes, including the above exposure apparatus; a local area network for connecting the manufacturing apparatuses; and a gateway for allowing access to an external network outside the factory from the local area network, wherein information about at least one of the manufacturing apparatuses is communicated. --

Please substitute the paragraph beginning at page 15, line 12, with the following.

-- A top plate 8 is mounted on the reticle stage 7 so as to be flush with the upper surface of the reticle 6. This prevents the reticle stage 7 from shifting from a portion effectively purged by the cover 3 even if the reticle stage 7 moves by a scan operation. The impurity inside the cover 3 can be satisfactorily removed. It is more desirable to surround a purge area 9 outside the cover 3 with another cover or the like, purge the purge area 9, and remove the impurity to a given degree. With this arrangement, the impurity inside the cover 3 can be removed to a lower concentration. An example of the purge area 9 can be a space defined by a chain double-dashed line. --

Please substitute the paragraph beginning at page 18, line 8, with the following.

-- A top plate 24 is mounted on the wafer stage 20 to be flush with the wafer 21. This prevents the wafer stage 20 from shifting from a portion effectively purged by the cover 22 even if the wafer stage 20 moves by a scan operation. --

Please substitute the paragraph beginning at page 19, line 13, with the following.

-- In the exposure apparatus of the first embodiment, the impurity in the optical path of a fluorine gas laser light can be purged even with the use of a fluorine gas laser light for exposure light, thereby ensuring a satisfactory transmittance and stability. By connecting an inert gas supply tube to the reticle surface plate 10, the control characteristics of the reticle stage 7 can be improved because no vibrations from the tube ~~do not~~ transmit to the reticle stage 7. --

Please substitute the paragraph beginning at page 19, line 23, and ending on page 21, line 5, with the following.

-- Fig. 2A shows the main part of a step ~~&~~ and scan type projection exposure apparatus according to the second embodiment of the present invention. Figs. 2B and 2C are sectional views of the exposure apparatus shown in Fig. 2A taken along the lines B - B and C - C, respectively. In the second embodiment, a sheet glass 30 is attached to the opening of a reticle surface plate 10 in place of the enclosure 17 described in the first embodiment. A first space 100 is defined by a reticle 6, a reticle stage 7, the reticle surface plate 10, and the sheet glass 30. A second space 200 is defined by the reticle surface plate 10, the sheet glass 30, and a projection optical system 19. The sheet glass 30 is laid out such that its upper surface (i.e., the surface on

the reticle stage 7 side) is flush with the upper surface (i.e., the surface on the reticle stage 7 side) of the reticle surface plate 10. By reducing the step in this manner, the optical path extending from the lower surface of the reticle stage 7 to the projection optical system 19 is hardly disturbed by a scan operation of the reticle stage 7. Accordingly, the concentrations of the impurities which absorb ultraviolet rays stabilize, and spatial and temporal changes in exposure amount further stabilize. The sheet glass 30 may be an optical element for correcting the optical characteristics of exposure light. Conceivable examples of the sheet glass 30 are a spherical lens such as a concave, convex, or cylindrical lens, an aspherical lens, and an optical element whose plane has undergone partial aspherical processing. The sheet glass 30 is preferably so attached as to easily exchange it when contaminants are deposited on the surface. The reticle surface plate 10 has gas supply portions 16 for supplying purge gas made of inert gas into the first and second spaces 100 and 200. The remaining arrangement is the same as that in the first embodiment. --

Please substitute the paragraph beginning at page 21, line 6, with the following.

-- In the exposure apparatus of the second embodiment, the first and second spaces 100 and 200 are purged even if the reticle stage 7 moves by a scan operation since this exposure apparatus does not require any enclosure 17 attached to the reticle stage 7, unlike the first embodiment, the reticle stage 7 can be simplified. Since the sheet glass 30 is set on the reticle surface plate 10 serving as a stationary portion, the reticle stage 7 can be further simplified without any deformation of the sheet glass 30 caused by driving of the stage or any changes in optical characteristics. --

Please substitute the paragraph beginning at page 22, line 26, and ending on page 23, line 19, with the following.

-- Fig. 4 is a view showing a structure from the illumination optical system to reticle surface plate of an exposure apparatus according to the fourth embodiment. In the fourth embodiment, a supply port 31 for supplying purge gas is formed on one side of a reticle surface plate 10 in the third embodiment, and a recovery port 32 for recovering purge gas is formed on the other side of the reticle surface plate 10, thereby purging a purge area 110 with purge gas. This can also be applied to the first and second embodiments. Purge gas is supplied from the supply port 31 to the vicinity of a reticle in a direction indicated by an arrow. At the same time the purge gas is recovered from a recovery port 32. Exposure light enters a projection optical system via a sheet glass 30. The direction in which purge gas flows may be parallel, perpendicular, or oblique to the scan direction, or may change together with <u>the</u> scan. The purge gas direction is desirably perpendicular to the scan direction so as not to generate any exposure difference in the scan direction. --

Please substitute the paragraph beginning at page 27, line 10, with the following.

-- A detailed arrangement will be described with reference to Fig. 12. In normal exposure, a valve 1202 is closed to prevent mixing of oxygen and/or ozone, and a valve 1201 is opened to supply only inert gas into an optical path, i.e., <u>a</u> purge area through a gas supply portion 16. In a standby state in which the exposure apparatus is inactive, during normal exposure at a designated time interval, or in a case wherein a reticle is set on the reticle stage, the valve 1202 is opened to mix a small amount of oxygen and/or ozone in <u>the</u> inert gas and <u>to</u> purge

the purge area. Without loading any wafer, a dummy exposure operation is done for a predetermined time or until a ~~described~~ prescribed illuminance at the image plane is attained. After that, mixing of oxygen and/or ozone is stopped. Only inert gas is supplied for purge, and a normal exposure operation is executed. --

Please substitute the paragraph beginning at page 27, line 27, and ending on page 29, line 16, with the following.

-- The effects unique to this arrangement will be explained. Short-wavelength exposure light such as far ultraviolet rays, particularly, an ArF excimer laser beam or fluorine excimer laser beam decomposes an impurity such as organic molecules in the air. The decomposition product is deposited on an optical element. The surface of the optical element bears a carbon film, a carbon-containing film, or a deposit of the organic compound. The transmittance of the optical element gradually decreases to decrease the illuminance at the image plane, resulting in low throughput. In the above embodiments, the vicinity in low throughput. In the above embodiments, the vicinity of the reticle 6 or wafer 21 is purged with inert gas to minimize the impurity concentration, but a small amount of ~~impurity~~ impurities may remain. For example, degassing may occur from a resist applied to the wafer 21 or an adhesive layer between the resist and the wafer 21 during or before exposure, and an impurity may exist near a sheet glass 35 below the projection optical system 19. Also, the reticle 6 with a small amount of ~~impurity~~ impurities may be loaded and part of the ~~impurity~~ impurities may evaporate, or degassing may occur from an adhesive layer between the reticle 6 and a pellicle frame or an adhesive layer between the pellicle frame and a pellicle 5, and the ~~impurity~~ impurities may exist near a sheet

glass 4 below the illumination optical system 1, the sheet glass 30 of the reticle surface plate 10, or the surface of an optical element above the projection optical system 19. In these cases, the organic compound decomposed and produced by exposure is deposited on optical elements, and the transmittance gradually decreases. To prevent this, these optical elements are illuminated with exposure light during purge while a small amount of ozone is mixed in inert gas. The deposited organic compound is oxidized and decomposed by a so-called ozone cleaning effect, and deposition of the decomposition product is prevented. Alternatively, the optical elements are illuminated with exposure light during purge while a small amount of oxygen is mixed in the inert gas. Then, oxygen is converted into ozone by a photochemical reaction, obtaining the same ozone cleaning effect as that of a mixture of ozone. Periodic execution of this processing can prevent a decrease in illuminance at the image plane and can always maintain high throughput. --

Please substitute the paragraph beginning at page 29, line 18, with the following.

-- A production system for a semiconductor device (e.g., a semiconductor chip such as an IC or LSI, a liquid crystal panel, CCD, a thin-film magnetic head, a micromachine, or the like) will be exemplified. A trouble remedy or periodic maintenance of a manufacturing apparatus installed in a semiconductor manufacturing factory, or maintenance service such as software distribution is performed by using a computer network outside the manufacturing factory. --

Please substitute the paragraph beginning at page 29, line 27, and ending on page 30, line 23, with the following.

-- Fig. 7 shows the overall system cut out at a given angle. In Fig. 7, reference numeral

101 denotes a business office of a vendor (apparatus supply manufacturer) which provides a semiconductor device manufacturing apparatus. Assumed examples of the manufacturing apparatus are semiconductor manufacturing apparatuses for performing various processes used in a semiconductor manufacturing factory, such as pre-process apparatuses (e.g., a lithography apparatus including an exposure apparatus, a resist processing apparatus, and an etching apparatus, an annealing apparatus, a film formation apparatus, an inspection apparatus, and the like). The business office 101 comprises a host management system 108 for providing a maintenance database for the manufacturing apparatus, a plurality of operation terminal computers 110, and a LAN (Local Area Network) 109 which connects the host management system 108 and computers 110 to construct an intranet. The host management system 108 has a gateway for connecting the LAN 109 to Internet 105 as an external network of the business office, and a security function for limiting external accesses. --

Please substitute the paragraph beginning at page 30, line 24, and ending on page 32, line 11, with the following.

-- Reference numerals 102 to 104 denote manufacturing factories of the semiconductor manufacturer as users of manufacturing apparatuses. The manufacturing factories 102 to 104 may belong to different manufacturers or the same manufacturer (e.g., a pre-process factory, a post-process factory, and the like). Each of the factories 102 to 104 is equipped with a plurality of manufacturing apparatuses 106, a LAN (Local Area Network) 111 which connects these apparatuses 106 to construct an intranet, and a host management system 107 serving as a monitoring apparatus for monitoring the operation status of each manufacturing apparatus 106.

The host management system 107 in each of the factories 102 to 104 has a gateway for connecting the LAN 111 in the factory to the Internet 105 as an external network of the factory. Each factory can access the host management system 108 of the vendor 101 from the LAN 111 via the Internet 105. The security function of the host management system 108 authorizes access of only a limited user. More specifically, the factory notifies the ~~vender~~ vendor via the Internet 105 of status information (e.g., the symptom of a manufacturing apparatus in trouble) representing the operation status of each manufacturing apparatus 106. The factory can receive, from the ~~vender~~ vendor, response information (e.g., information designating a remedy against the trouble, or remedy software or data) corresponding to the notification, or maintenance information such as the latest software or help information. Data communication between the factories 102 to 104 and the ~~vender~~ vendor 101 and data communication via the LAN 111 in each factory adopt a communication protocol (TCP/IP) generally used in the Internet. Instead of using the Internet as an external network of the factory, a dedicated-line network (e.g., ISDN) having high security which inhibits access of a third party can be adopted. It is also possible that the user constructs a database in addition to one provided by the vendor and sets the database on an external network and that the host management system authorizes access to the database from a plurality of user factories. --

Please substitute the paragraph beginning at page 32, line 12, and ending on page 34, line 5, with the following.

-- Fig. 8 is a view showing the concept of the overall system of this embodiment that is cut out at a different angle from Fig. 7. In the above example, a plurality of user factories having

manufacturing apparatuses and the management system of the manufacturing apparatus vendor are connected via an external network, and production management of each factory or information of at least one manufacturing apparatus is communicated via the external network. In the example of Fig. 8, a factory having manufacturing apparatuses of a plurality of vendors, and the management systems of the vendors for these manufacturing apparatuses are connected via the external network of the factory, and maintenance information of each manufacturing apparatus is communicated. In Fig. 8, reference numeral 201 denotes a manufacturing factory of a manufacturing apparatus user (semiconductor device manufacturer) where manufacturing apparatuses for performing various processes, e.g., an exposure apparatus 202, a resist processing apparatus 203, and a film formation apparatus 204 are installed in the manufacturing line of the factory. Fig. 8 shows only one manufacturing factory 201, but a plurality of factories are networked in practice. The respective apparatuses in the factory are connected to a LAN 206 to construct an intranet, and a host management system 205 manages the operation of the manufacturing line. The business offices of vendors (apparatus supply manufacturers) such as an exposure apparatus manufacturer 210, a resist processing apparatus manufacturer 220, and a film formation apparatus manufacturer 230 comprise host management systems 211, 221, and 231 for executing remote maintenance for the supplied apparatuses. Each host management system has a maintenance database and a gateway for an external network, as described above. The host management system 205 for managing the apparatuses in the manufacturing factory of the user, and the management systems 211, 221, and 231 of the vendors for the respective apparatuses are connected via the Internet or dedicated-line network serving as an external network 200. If a trouble occurs in any one of a series of manufacturing apparatuses along the manufacturing line

in this system, the operation of the manufacturing line stops. This trouble can be quickly solved by remote maintenance from the vendor of the apparatus in trouble via the Internet 200. This can minimize the stop of the manufacturing line. --

Please substitute the paragraph beginning at page 34, line 6, and ending on page 35, line 12, with the following.

-- Each of the manufacturing apparatuses in the semiconductor manufacturing factory comprises a display, a network interface, and a computer for executing network access software and apparatus operating software which are stored in a storage device. The storage device is a built-in memory, hard disk, or network file server. The network access software includes a dedicated or general-purpose web browser, and provides a user interface having a window as shown in Fig. 9 on the display. While referring to this window, the operator who manages manufacturing apparatuses in each factory inputs, in input items on the windows, pieces of information such as the type of manufacturing apparatus (401), serial number (402), subject of trouble (403), occurrence data (404), degree of urgency (405), symptom (406), remedy (407), and progress (408). The pieces of input information are transmitted to the maintenance database via the Internet, and appropriate maintenance information is sent back from the maintenance database and displayed on the display. The user interface provided by the web browser realizes hyperlink functions (410 to 412), as shown in Fig. 9. This allows the operator in the factory to access detailed information of each item, receive the latest-version software to be used for a manufacturing apparatus from a software library provided by a vendor, and receive an operation guide (help information) as a reference for the operator in the factory. The maintenance

information provided by the maintenance database also includes information about the features of the present invention described above. The software library also provides the latest-version software for implementing the features of the present invention. --

Please substitute the paragraph beginning at page 35, line 13, and ending on page 36, line 13, with the following.

-- A semiconductor device manufacturing process using the above-described production system will be explained. Fig. 10 shows the flow of the whole manufacturing process of the semiconductor device. In step 1 (circuit design), a semiconductor device circuit is designed. In step 2 (mask formation), a mask having a designed circuit pattern is formed. In step 3 (wafer manufacture), a wafer is manufactured using a material such as silicon. In step 4 (wafer process) called a pre-process, an actual circuit is formed on the wafer by lithography using the prepared mask and wafer. Step 5 (assembly) called a post-process is the step of forming a semiconductor chip by using the wafer manufactured in step 4, and includes an assembly process (dicing and bonding) and a packaging process (chip encapsulation). In step 6 (inspection), inspections such as the operation confirmation test and durability test of the semiconductor device manufactured in step 5 are conducted. After these steps, the semiconductor device is completed and shipped (step 7). The pre-process and post-process are performed in separate dedicated factories, and maintenance is done for each of the factories by the above-described remote maintenance system. Information for production management and apparatus maintenance is communicated between the pre-process factory and the post-process factory via the Internet or dedicated-line network. --

Please substitute the paragraph beginning at page 36, line 14, and ending on page 37, line 9, with the following.

-- Fig. 11 shows the detailed flow of the wafer process. In step 11 (oxidation), the wafer surface is oxidized. In step 12 (CVD), an insulating film is formed on the wafer surface. In step 13 (electrode formation), an electrode is formed on the wafer by vapor deposition. In step 14 (ion implantation), ions are implanted in the wafer. In step 15 (resist processing), a photosensitive agent is applied to the wafer. In step 16 (exposure), the above-mentioned exposure apparatus exposes the wafer to the circuit pattern of the mask. In step 17 (developing), the exposed wafer is developed. In step 18 (etching), the resist is etched except for the developed resist image. In step 19 (resist removal), an unnecessary resist after etching is removed. These steps are repeated to form multiple circuit patterns on the wafer. A manufacturing apparatus used in each step undergoes maintenance by the remote maintenance system, which prevents ~~a~~ trouble in advance. Even if ~~a~~ trouble occurs, the manufacturing apparatus can be quickly recovered. The productivity of the semiconductor device can be increased in comparison with the prior art. --

Please substitute the paragraph beginning at page 37, line 10, with the following.

-- As has been described above, according to the present invention, oxygen and moisture can be partially, effectively purged near a reticle and/or wafer in an exposure apparatus using ultraviolet rays, particularly, an ArF excimer laser beam or a fluorine (F_2) excimer laser beam can be obtained. This realizes high-precision projection exposure and satisfactory projection of a fine circuit pattern. --